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The Impact of Ginger on Alleviating Motion Sickness

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ABSTRACT

Objective: To determine the association of beneficial effects of Ginger on motion sickness.
Study Design: Quasi-Experimental study.
Place and Duration of Study: Aero-Medical institute Pakistan Air force Masroor base, Karachi Pakistan, from May to Oct 2019.
Methodology: Quasi- Experimental study was carried out on 60 pilots, divided into two groups control and a trial group. Thirty pilots were randomly placed in each group. Both groups were matched, control group was served with placebo juice whereas trial group was served with ginger juice to drink. Both groups were placed in a simulator to induce motion sickness. Later on they were asked to fill a simulator sickness questionnaire. Responses were analyzed in Statistical Package for Social Sciences version 20.
***Results*:** In Control group 19(63.3%) of individuals experienced motion sickness and 11(36.7%) did not experience motion sickness whereas in trial group only 9(29.8%) individuals experienced motion sickness while 21(70.2%) of individuals did not experience motion sickness.
Conclusion: Ginger is more effective in reducing motion sickness as compared to placebo. It shows that individuals of trial group showed good response to ginger as compared to placebo in control group.

Keywords: Ginger juice, Motion sickness, Vestibular illusion demonstrator (VID).

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INTRODUCTION

Ginger, the "root" or the rhizome, of the plant Zingiberofficinale, has been a popular spice and herbal medicine for thousands of years.[1] The flesh of the ginger rhizome can be yellow, white or red in color, depending upon the variety.[2] It is covered with either brownish skin that may be thick or thin.[2] The ginger rhizome has a firm, striated texture and a taste that is aromatic, pungent and hot. It has a long history of use in Asian, Indian, and Arabic herbal traditions.[3] In China, ginger has been used to treat nausea and vomiting for more than 2,000 years.[1,4-6]

Motion sickness, also known as kinetosis and travel sickness, is a condition in which a disagreement exists between visually perceived movement and the vestibular system's sense of movement. Depending on the cause, it can also be referred to as seasickness, carsickness, simulation sickness or airsickness.[7] Hyperventilation, cold sweats, dizziness, fatigue, nausea and vomiting are the most common and disturbing symptoms of motion sickness. It is an unpleasant, disturbing and most commonly reported syndrome among jet pilots, travelling torturous roads of hilly area, sea voyage.[8]

Surveys show that incapacitating motion sickness occurs in 29 percent of airline pilots. Motion sickness is even more common when using a flight simulator, and up to 70 percent of pilots are affected. Surprisingly, the best pilots are the most susceptible. This is probably because they are more familiar with how the simulator should act, and when it doesn't, the difference between visual and vestibular senses is more obvious.[8]

Drugs are available for the treatment of motion sickness but the problems with these drugs are their side effects, and for this reason, these drugs are not allowed to be used by pilots. Ginger root has long been used in traditional Chinese medicine to prevent nausea and vomiting.[9] No known side effect is caused by ginger since it had been in use for the last several decades. Drinking ginger tea before flying may be helpful to treat the motion sickness. USA Federal aviation administration does not specially prohibit the use of any herbal medicine including ginger for pilots.[2,4,7]

Role of ginger in treatment of motion sickness is being studied worldwide. Some studies show that motion sickness can be treated with ginger tea on the

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other hand, few studies do not favor this hypothesis. Unfortunately, inadequate data is available in Pakistan about effects of ginger on motion sickness.

METHODOLOGY

After approval of ethical committee, total sample size of 60 (30 exposed and 30 non-exposed) was estimated via EPi Tools Epidemiological calculator in accordance to the results of study done by Lete that showed 33.33% of exposed with outcome while keeping level of significance 5%, confidence 95%.[10]

Inclusion criteria: Male pilots working in Masroor base Karachi, Pakistan.

Exclusion criteria: Hypersensitivity/ allergy to ginger or ginger extract.

We consecutively sampled 60 subjects, total number of sample size was equally matched and divided into two groups of thirty pilots. One group of thirty participants represented those who were administered Ginger solution while second group of thirty participants included those who were administered Placebo. Participants satisfying the inclusion and exclusion criteria were included in each group (control and trial group). Participants of both groups were informed about the nature of the experiment and written informed consent was obtained. Then control group was served with 1 gram of placebo juice and trial group with 1 gram of ginger juice by keeping the administrator and participant blind. It was ensured that quantity, color and taste of the drinks were exactly the same in both groups. After half an hour everyone was made to sit in vestibular illusion demonstrator (VID) for four minutes at the rate of 60 degrees per second and motion sickness was induced by cross couple stimulation of semicircular canals by asking individuals to follow head movement commands of simulator (VID). Vestibular illusion demonstrator is a training device for aviators. It is designed to demonstrate illusions or produce confusing situation by upsetting human vestibular functions. These effects are induced through a clockwise or counterclockwise rotation at rate typically not greater than 20 rotations per minute.

After four minutes in vestibular illusion demonstrator (VID), participants were asked to fill simulator sickness questionnaire form on the basis of their feelings at that time. Simulator sickness questionnaire (SSQ)contain 16 parameters like fatigue, headache, eye strain, difficulty focusing, sweating, nausea, difficulty concentrating, dizziness, vertigo and burping.[11] Each parameter with none, mild, moderate and sever severity and containing score 0, 1, 2 and 3 respectively. Individual scores were calculated. After getting individual score mean score of all the participants was calculated to obtain cut off score. Score that falls above the mean is considered positive or presence of the symptoms while scores falling below the mean score is considered as negative or absence of symptoms.

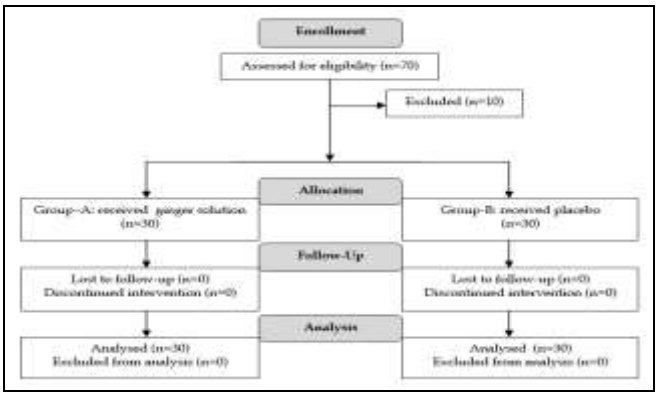

Figure: Patient flow diagram

Data analysis was performed using Statistical Package for Social Sciences v 20.0 (SPSS Inc., Chicago, IL, USA) for windows. Quantitative data was represented using Mean±standard deviation. Qualitative data was represented by using percentage and frequency. For association and comparison Pearson's Chi square test was used. The *p*-values of ≤0.05 were considered significant.

RESULTS

All of the participants 60(100 %) were male and employed pilots in Air force. Their mean age was 27.38±4.36 years and 28.20±7.79 for control and experimental group respectively depicting that all participants were young in age. Mean SSQ Score of this study was 3.40±1.53 that was taken as cut off score. In total 28(46.7%) out of sixty participants developed motion sickness while 32(53.3%) participants did not.

19(63.3%) participants of control group developed motion sickness as compared to 9(29.8%) participants of experimental group who developed motion sickness. While 11(36.7%) of control group did not develop motion sickness as compared to 21(70.2%) of participants of experimental group that did not develop motion sickness. From experimental group 18(61.3%) of the participants had 11 to 20 years of

service experience, 7(25.4%) had 1 to 10 years of service experience while 5(14.5%) of participants had 21 to 30 years of service experience. From control group 16(53.3) 0f the participants had 1 to 10 years of service experience, 12(40%) had 11 to 20 years while 2(6.6%) had 21 to 30 years of service experience shown in Table-I.

Table-I: Demographic Characteristics of Study Participants (N=60)

Parameters	Ginger Group (n=30)	Control Group (n=30)
Age (Mean±SD)	27.38±4.36	28.20±7.79
Marital status		
Single (n=43)	20(68.6%)	23(73.6%)
Married (n=17)	10(33.3%)	7(23.3%)
Motion Sickness		
Present (n=28)	9(29.8%)	19(63.3)
Absent (n=32)	21(70.2%)	11(36.7)
Experience (years of service)		
1-10	7(25.4%)	16(53.3%)
11-20	18(61.3%)	12(40.0%)
21-30	5(14.5%)	2(6.6%)

After evaluating statistical correlation between motion sickness and ginger a significant correlation was found between intake of ginger solution and absence of motion sickness (p <0.001) while no correlation was found between years of service experience and presence of motion sickness (p =0.103) shown in Table-II.

Table-II: Motion Sickness and Experience of Service in Relation to Ginger Intake and Placebo (N=60)s

Group	Motion sickness n(%)		*p*-value	Experience (service of years) n(%)			*p*-value
	present	Absent		1-10	11-20	21-30	
Ginger group (n=30)	9(29.8%)	21(70.2%)	<0.001	7(25.4%)	18(61.3%)	5(14.5%)	0.103
Control group (n=30)	19(63.3%)	11(36.7%)		16(53.3%)	12(40.0%)	2(6.7%)	

DISCUSSION

World health organization (WHO) has recognized anti emetic properties of ginger[12] which has been observed not only in this study but also in several other international studies as noted by Ravindranin a double blind randomized placebo trial those who took ginger had less vomiting and cold sweats compared to those who took placebo.[2] In this study it has been noted that 70% of participants taking ginger did not develop motion sickness after sitting in vestibular illusion demonstrator (VID) for four minutes that rotates at a rate of 20 rotations per minute similar results have been demonstrated in another study by Yusof, involving 36 participants highly susceptible to motion sickness respond better to ginger than placebo when administered ginger 30 minutes before testing in a motor driven rotating chair.[3] It is interesting to mention result of study done by Stewartt according to which group taking ginger showed poor response to motion sickness as compared to group taking scopolamine while they were spinning in a rotatory chair.[13] Similarly, White in his review observed that although ginger is effective in nausea and vomiting induced after pregnancy and operative procedures but for effectiveness of ginger in motion sickness evidence is less supportive.[14] These results are contrary to the results of this study in which participants taking ginger showed better response after rotation in VID. Results of this study are also consistent with the results of a systematic review done by O'Donnel which has shown that for motion sickness ginger has proven to be better than placebo and vitamin B6.[15]

Very less data about dose of ginger is available and there is no agreement over safe daily dose of ginger but in most of studies conducted by Vilgoen *et al.* 1000mg of ginger is recommended for relief of nausea vomiting induced by pregnency.[16] Ding *et al.* in his meta-analysis recommended 1000mg of ginger for nausea relief.[17] European medicine agency recommends 1000mg of ginger 1 hour before travel for relief of motion sickness.[15] Results of this study are consistent with these international studies as after dose of 1000mg of ginger 70% of participants did not develop motion sickness after getting exposed to rotations in VID. Lien *et al.* In his study has demonstrated that when volunteers were given 1000mg of ginger before undergoing circular vection to induce motion sickness ginger not only reduced nausea but also shortened recovery time after circular vection. Similar results have been observed in this study that shows that administration of 1000mg of ginger in volunteers before going into VID rotations ginger effectively reduces motion sickness.[16] Aslani in his study noted that 50 mg of dried ginger extract in chewing gum has shown to be good drug delivery system with better results in motion sickness.[18]

Reduced gastric activity is associated with nausea and vomiting induced in motion sickness, seasickness, pregnancy, chemotherapy and radiotherapy.[19] Therefore, in recent year's effectiveness of ginger as an anti-

emetic has been extensively explored for nausea and vomiting of pregnancy, sea sickness, chemotherapy and radiotherapy. Studies have shown that ginger reduces nausea and vomiting during pregnancy.[20,21] Viljoen highlights that ginger is safe and effective for nausea and vomiting in pregnancy.[15] Shawahna in her study done to achieve consensus over potential harm and benefit of ginger to manage nausea and vomiting of pregnancy has concluded that 92.9% of consensus was achieved on beneficial use of ginger in nausea and vomiting of pregnancy.[22] Ullah and his colleagues have established that zingiber officinal (ginger) is effective in reducing chemotherapy induced nausea and vomiting.[20] Like all these studies that favor ginger as beneficial for nausea and vomiting results of this study are also indicative that ginger (zingiberofficinale most probably due to its effect on gastric slow wave dysrhythmias)[18] is beneficial for motion sickness induced by VID as compared to placebo.

Further local studies are required to establish the effective dose of ginger (zingiberofficinale) for use in motion sickness and nausea and vomiting induced in pregnancy, seasickness, chemotherapyand radio therapy. Furthermore, there is requirement of studies to establish the pharmacokinetics and pharmacodynamics of the active ingredient present in ginger.

CONCLUSION

Ginger (zingiberofficinale) is more effective in reducing the signs and symptom of motion sickness induced in vestibular illusion demonstrator (VID) as compared to placebo.

Conflict of Interest: None.

Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

MT & SAK: Data acquisition, data analysis, critical review, approval of the final version to be published.

SAM & MAC: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

REFERENCES

1. NikkhahBodagh M, Maleki I, Hekmatdoost A. Ginger in gastrointestinal disorders: a systematic review of clinical trials. Food science & nutrition 2019; 7(1): 96-108.
2. Ravindran PN, Babu KN, editors. Ginger: the genus Zingiber. CRC press; 2016.
3. Yusof YA. Gingerol and its role in chronic diseases. InDrug discovery from mother nature 2016 (pp. 177-207). Springer, Cham.
4. Soltani E, Jangjoo A, Aghaei MA, Dalili A. Effects of preoperative administration of ginger (Zingiberofficinale Roscoe) on postoperative nausea and vomiting after laparoscopic cholecystectomy. Journal of traditional and complementary medicine 2018; 8(3): 387-390.
5. Shahrajabian MH, Sun W, Cheng Q. Clinical aspects and health benefits of ginger (Zingiberofficinale) in both traditional Chinese medicine and modern industry. Actaagriculturaescandinavica, section b—Soil & Plant Science 2019; 69(6): 546-556.
6. Srinivasan K. Ginger rhizomes (Zingiberofficinale): A spice with multiple health beneficial potentials. PharmaNutrition 2017; 5(1): 18-28.
7. Sharifi-Rad M, Varoni EM, Salehi B, Sharifi-Rad J, Matthews KR, Ayatollahi SA et al. Plants of the genus Zingiber as a source of bioactive phytochemicals: From tradition to pharmacy. Molecules 2017; 22(12): 2145.
8. Albooghobeish M, Ghomeishi A, Adarvishi S, Neisi A, Mahmoodi K, Asadi M et al. The effect of preoperative zintomacapsule on postoperative nausea and vomiting after laparoscopic cholecystectomy. Anesthesiology and Pain Medicine 2018; 8(5).
9. Khodaveisi Z, Borzou SR, Mohammadi Y, Azizi A. The Effect of Inhalation of Ginger Extract on Postoperative Nausea, Retching and Vomiting after Laparoscopic Cholecystectomy: A Randomized Clinical Trial. Journal of Health and Care 2019; 21(2): 126-134.
10. Lete I, Alluė J. The effectiveness of ginger in the prevention of nausea and vomiting during pregnancy and chemotherapy. Integrative medicine insights. 2016; 11: IMI-S36273.
11. Balk SA, Bertola MA, Inman VW. Simulator sickness questionnaire: twenty years later. Proceedings of the Seventh International Driving Symposium on Human Factors in Driver Assessment, Training and Vehicle Design 2013: 257-263. https://doi.org/10.17077/drivingassessment.1498
12. Shahrajabian MH, Sun W, Cheng Q. The power of natural Chinese medicine, ginger and ginseng root in an organic life. Middle-East Journal of Scientific Research 2019; 27(1): 64-71.
13. Bameshki A, Namaiee MH, Jangjoo A, Dadgarmoghaddam M, Ghalibaf MH, Ghorbanzadeh A. Effect of oral ginger on prevention of nausea and vomiting after laparoscopic cholecystectomy: a double-blind, randomized, placebo-controlled trial. Electronic physician 2018; 10(2): 6354.
14. Murray V, Shaw D. WHO Monographs on Selected Medicinal Plants, Volume 1. Health and Hygiene 2000 Jul 1; 21(3): 129.
15. Shahrajabian MH, Sun W, Cheng Q. A Short Review of Goji Berry, Ginger, Ginseng and Astragalus in Traditional Chinese and Asian Medicine. Black Sea Journal of Health Science 2020: 3(2): xx.xx.
16. Elvir-Lazo OL, White PF, Yumul R, Eng HC. Management strategies for the treatment and prevention of postoperative/postdischarge nausea and vomiting: an updated review. F1000Research 2020; 9(83).
17. Aslani A, Ghannadi A, Rostami F. Design, Formulation and evaluation of ginger medicated chewing gum. Adv Biomed Res 2016; 5(130). https://doi.org/10.4103/2277.9175.187011. eCollection 2016.

18. Azizi A, Khatibian M, Mohamadian A, Soltanian A, SalehzadehGlonduz F. Effect of Patient Education About Patient-controlled Analgesia Pump Preoperative on Severity of Pain, Nausea and Vomiting After Spinal Culumn Surgery. Avicenna Journal of Nursing and Midwifery Care 2020; 27(6): 405-414.
19. Maroufi SS, Moradimajd P, Moosavi SA, Imani F, Samaee H, Oguz M. Dose Ginger Have Preventative Effects on PONV-Related Eye Surgery? A Clinical Trial. Anesthesiology and Pain Medicine 2019; 9(5).
20. Ali BH, Blunden G, Tanira MO, Nemmar A. Some phytochemical, pharmacological and toxicological properties of ginger (Zingiberofficinale Roscoe): a review of recent research. Food ChemToxicol 2008; 46(2): 409-420.
21. Shawahna R, Taha A. Which potential harm and benefit of using ginger in the management of nausea and vomiting of pregnancy should be addressed? A consensual study among pregnant women and gynecologist. BMC complement Altern Med 2017; 17(1): 204. https://doi.org/10.1186/s12906-017-1717-0.
22. Jiang TA. Health benefits of culinary herbs and spices. Journal of AOAC International 2019; 102(2): 395-411.

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